



## Non- Provisional Patent Application of

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For

### PROTECTIVE TRAUMA DEVICE STRAPS FOR HELMETS

#### FIELD OF INVENTION

Present invention relates to providing a more secure protective device to prevent cervical injury in a fall or life -threatening trauma accident, where helmets are worn in sport activates.

#### BACKGROUND

There are many shapes, sizes, styles of protective helmets for protection, which provide a protective body, designed to distribute impact over head area.

Helmets are used in bicycling, equestrian horseback. football, hockey, and motorcycling and other sport activates. Helmets are all held in place by chin strap attachment and opposite sides rear Y lateral straps member to helmet wall, which provide no protection in the downward compression of the chin into the chest area or the backward flexion of head, each cause compression of cervical vertebra of the wearer in a fall or life -threatening trauma accident on sudden impact.

Chin straps have various cushioning attachments known such as U.S. patent 5,500,951, Marchello, March 26, 1996, which provides a shock absorbing cushion pad to cover chin strap, which only provides for collectively distributing trauma load on chin strap that is in contact with wearers body and to ventilate perspiration away from chin strap and wearers body.

In U.S. patent 5,911,315, Flowers, June 15, 1999, provides for modified chinstrap that is secured on wearers chin instead beneath wearers neck by attaching an adapter between the end of the helmet straps. This does not

provide any protection of the downward compression of chin into chest area as present invention provides.

In U.S. patent 5,737,777, Hillary, April 14, 1998, which only provides for protection for the hypoglossal area of the throat from upward pressure of helmet chinstrap by providing a cushion wrap for wearers jaw not for chin area.

In U.S. patent 5,347,660, Zide et. al., September 20, 1994, which is an adjustable high low hook up for chinstrap having continuous straps with adjustable fasteners that are connected to chin cup which does not provide any cushion protection of the downward compression of chin into chest area, as does present invention

In U.S. patent 3,855,631, Ettinger, December 24, 1974, discloses an inflatable protective neck collar for football players. The collar is separate segment and is constantly inflated as to full the gap between head and shoulders, limiting free movement of head and neck. The trauma impact is impacted to cervical spine by the downward compression of chin into chest area. Present invention provides protection for impact compression of cervical spine.

In U.S. PATENT 6,182,300, B1, Severance, February 6, 2001, invention related to neck protective helmet and shoulder pads integrated system. The neck protection only covers a portion of neck area. Designed for football it can't be used on other helmets in other sport activates. Present invention can and prevents the downward compression of chin into chest area.

In U.S. patent 6,052,835, O'Shea, April 25, 2000, a protective head gear for contact sports where helmets are used. Made up of a crown, coupled to crown base a pair of opposite side segments positioned at back of wearer's neck coupled to collar and rotor connected. Collar portion having rigid layer adapted to position around wearer's neck. Collar forms a part of protective collars shoulder pads. Present invention provides for a semi rigid material made out of plastic, rubber, polyethylene, which is not rigid as in this patent, so as to absorb trauma shock more effectively and not part of shoulder pads or only used in football and contact sports, present invention can be used on

any retention helmet system.

In U.S. patent 5,287,562, Rush 111, February 22, 1994, which is an inflatable bag which is normally folded as not to restrict normal movement of head and neck, but on inflation will fill gap between the helmet and rim and the shoulders of wearer. Inflation is done by means of gas generator; inflation is limited in use due to puncture and valve failure, which makes it useless and prone to repair, or replacement. Present invention provides for semi rigid material made up of plastic, rubber, polyethylene, cushion of sufficient strength and elasticity to absorb trauma in a fall or life-threatening accidents.

In U.S. patent 5,826,281, Rush 111, October 27, 1998, provides for a inflatable pouch to adjust chin strap, by means of a manually operated valve pump and provide a shock absorbing cushion on chin strap. Inflatable pouch can puncture, leak by valve failure. Present invention has no valve or pouch to malfunction or puncture.

In U.S. patent application 2001/0004772 A1, Rush 111, June 28, 2001, all such cushions are constructed of highly feasible material or prone to puncture and valve failure. Consequently do nothing to protect the cervical spine in life- threatening accidents as present invention does.

In U.S., patent 5,315,718, Barson, May 31, 1994, military protective helmet has retention system, which allows it to fit various head sizes and shapes. It has pusher plate, which hangs from rear of helmet on adjacent horizontal straps, which are tensioned to push wearer's head forward to front of helmet. Helmet has horizontal straps as part of retention system, which does not provide for the protection of cervical spine as does present invention.

In U.S. patent 5,659,900, Arney et al, August 26, 1997, bicycle helmet rear elastic strap from one side to other contacts wearers head beneath the occipital region and applies forward and upward pressure against head to hold helmet in place. It does not provide for a protective cushion on strap as does present invention and wont protect wearer in a fall or life- threatening accident as present invention does. Elastic losses its elasticity over time and

becomes ineffective. Present invention member to helmets fabric straps doesn't have this occurrence.

In U.S. patent 6,425,142, B2, Sasaki et. al, July 30, 2002, a retention mechanism for helmet comprising of a shell for protecting head and a elasticity system comprising of a bowl designed to fit against occipital region of wearers head with a hinge coupling system to shell for movement, uses a spring element for positioning the bowl against occipital region of the head to stable helmet on wearers head. Does not provide a constant shock absorbing material as present invention does, and is independent from any spring element prone to dysfunction in trauma impact contact.

In U.S. patent 6,351,853,B1, Halsted, March 5, 2002, a fit system for helmet with a fluid impervious bladder wrap around side portions of cranium, temple areas and rear occipital protuberance so fluid flow of gas, gel or liquid can inflate bladder, which can crack or deteriorate. Present invention provides for constant reliable protection under the occipital protuberance where inflation is not a factor. Gas, liquids can leak and gel is heavier and adds to weight of helmet on wearer's head.

In U.S. 2002/0100109 A1, Hoop, August 01, 2002, a one section constructed piece, shown to fit over wearers head and extend downward over shoulders to provide a broad impact area, not where impact protection is most needed. This construction is cumbersome and adds to weight of wearer. In sports as bicycling, where movement is so critical to shift weight from side to side to gain momentum and speed, the device limits movement and adds to strain on body where freedom of movement is an important factor for endurance and safety. In football it does limit body movement, which football players are constantly doing, and adds to weight of their equipment. In equestrian horseback it will overpower rider and look awkward in events and restrict arm movements of rider to control their horse. In motorcycles it will prevent backpacks from being worn and limit movement of wearer and takes up needed space for additional rider. This device looks medieval, constricts wearer to limited movements and adds weight by encoring on their endives in sport activates. Present invention does not do the above and provides for a secure positioned cushion for cervical spine in a trauma impact fall or life-threatening accident where

helmets are worn. Present invention is attached and member part of helmet retention system and not restrictive in any form as above-mentioned patent.

In U.S. patent 6,442,765 B1, Fallon et. al. September 3, 2002. A three-piece fold panels is shown, to protect the top of head and sides, does not protect the cervical vertebra from trauma impact in a fall or life-threatening sport accident as present invention.

In U.S. PATENT 6,434,756 B1, Hoop, August 20, 2002. A chest cover, back cover, over head cover, and shoulder cover is shown it is bulky, awkward, cumbersome confining, movement limited and does not protect the cervical vertebra in a backward flexion of the head causing cervical injury do to trauma impact sport accident, as present invention does.

In U.S. PATENT 2002/0035748 A1, Racine, March 28, 2002. A pad made from foam is shown for helmet section rear occipital area designed for hockey helmets. It does not provide the trauma impact protection as does present invention, which provides for a under occipital protuberance cushion of semi rigid material not foam to absorb trauma shock in the backward flexion of head in a trauma sport accident.

In U.S. patent 2002/0010958 A1, Schiebl et. al, January 31, 2002. Is a bladder filled with viscous liquid in chin cup. Fluid leaks, bladder can rupture or dry up providing no protection. Chin cup provides no protection of chins downward compression into the chest area. Present invention provides protection for the downward movement of chin into chest area and backward flexion of the head in a sport trauma impact accident, to provide protection to the cervical vertebra.

In U.S. Patent 6,343,385 B1, Katz, February 5, 2002. Is shown beads of polyamine or bladder liquid or gel cushion to provide protection to frontal, temporal, occipital areas of the head. Bladders rupture, beads fall out liquids leaks, gel adds weight and clumps in age. These provide no protection to cervical vertebra as does present invention. Cushion of present invention is made of semi rigid material, concave, oval in design under chin, and concave under occipital protuberance to provide protection against

trauma impact, which causes disc compression and spinal injury in a fall or life-threatening sport accident.

## SUMMARY

Protective helmets vary and provide various shapes and forms. Their preferred embodiment as seen in prior art does not provide the protection as does present invention, as part of helmet strap retention system. Present invention embodiment provides for under chin protective device and under occipital protuberance protective trauma device to prevent cervical vertebra trauma and disc compression and damage to cervical spine in a fall or life-threatening accident from bicycles, equestrian horseback, football, hockey, motorcycles and other sport activates where helmets are used.

## BRIEF DESCRIPTION OF DRAWING FIGURES

The present invention will be described in greater detail with references to the accompanying drawings in which like elements bear like reference numerals where in:

FIG. 1A Is a right side prospective view of prior art helmet and its retention system.

FIG 1B Is a right side elevation view of prior art helmet and its retention system of FIG. 1A.

FIG. 2A Is a rear right side prospective view of one embodiment of helmet retention system in accordance with present invention showing manner in which horizontal VELCRO™ strap with concave protective trauma device attaches to rear distal Y lateral straps by VELCRO™ hook and loop fastening means on opposite sides to helmet retention system and longitudinal across and under occipital protuberance of wearer.

FIG. 2B Is a right side elevation view of helmet embodiment of retention system and member chinstrap with protective trauma device strap attached on opposite sides to it by VELCRO TM hook and loop fastening means. In accordance with present invention.

FIG. 3A Is a front elevation view of the head and neck of wearer with helmet embodiment of retention system, showing chinstrap assembly with protective trauma device strap attached to it by VELCRO TM hook and loop fastening means on opposite sides. In accordance with present invention.

FIG. 3B Is a left side elevation view of helmet embodiment of retention system showing as above in FIGS. 1A to 3A with protective trauma devices attached and member to helmet retention system by opposite sides VELCRO TM hook and loop fastening means. In accordance with present invention.

FIG. 4A Is a front perspective view of chin strap with member protective trauma device, with its opposite sides transverse positioned slots on opposite sides which allow member strap to pass through, which has VELCRO TM hook and loop fastening and attaching means on opposite sides to attach and member to chinstrap of retention system of helmet. As shown in embodiment of present invention

FIG. 4B Is a front perspective view of horizontal VELCRO TM strap with member protective trauma device, with transverse positioned slots on opposite sides which allow horizontal VELCRO TM strap to pass through which has VELCRO TM hook and loop fastening and attaching means on opposite sides to attach and member to rear distal Y lateral straps of retention system of helmet. As shown in embodiment of present invention.

## DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to FIGS 1A to 4B there is one embodiment 1 and an exchange of helmet body 2. Helmet body 2 comprising of crown segment is generally located above line 5 and skirt portion 6, which is positioned

below line 5. Crown segment 4 in use rest upon and generally covers the upper segments of wearer's head. Skirt segment 6 in use extends downward to some extent over sides and rear of wearer's head. The skirt provides for extension downward of helmet for protection along sides and rear of wearer's head. Crown segment 4 is at least partially covered by shell 100 of harder polymeric material and cut to conform to the outer surface of the crown portion of the helmet. The shell can help to stabilize the helmet structure and provide protective fit.

With reference to initially FIGS. 1A TO FIG. 4B protective helmets. According to one embodiment 1 of present invention includes helmet body 2 and protective trauma device 22 and member to strap 23 with cross attached and member strap 38A and 38B which are VELCRO™, one side hook other side loop, engaging material and stitched 42 and 45 or bonding on to ends of strap 23, opposite ends. VELCRO™ fastening means 30 hook and 32 loop attach on to themselves and member to chin strap 14. Protective trauma device 25 has opposite side transverse positioned slots 54 and 56 as shown in FIG.4A on opposite sides which allow strap 23 to pass through.

Horizontal strap 28 with protective trauma device 25 member to it has opposite sides transverse positioned slots 65 and 68 as shown in FIG. 4B on opposite sides to allow horizontal strap 28 which is VELCRO™, one side hook the other side loop engaging material to pass through. It's VELCRO™ adjustable fastening means 34 loop and 36 hook, on opposite sides attach on to themselves as part of retention system 12A and 12 B. The protection provided by 22 and 25 is enhanced by providing a cushion on impact.

Initially helmet is held in place by retention system 40. Horizontal adjustable strap 28 of present invention provides for a secure comfortable fit on wearer's head as shown in FIGS. 2A, 2B, 3B, under occipital protuberance area of wearer's head. This provides for helmet not to slip or shift from desired position on wearer's head. Helmet will rest square on wearer's head, just above brows and field of vision is not obstructed.



Retention system 40 comprises of adjustable strap arrangement that passes down from helmet in member attachment on opposite sides of wearer's head and meets in front of and behind the ear and under the chin. Such general strap arrangements are generally known in prior art and subject to improvements and variations.

To understand retention system of helmet as one ordinary skilled in prior art which will recognize helmet retention system of which is formed from unitary of a continues strap that is woven thru out the system.

Integrity of retention system 40 is a entire continues strap, to which present invention can be attached and member to by fasting VELCRO™ means 30 hook, 32 loop and 34 loop, 36 hook with no adverse effect on helmet retention system 40, to provide safety, comfort and reliable trauma protection to cervical spine of wearer.

Reference now particularly to FIGS. 1A to 4B and retention system 40 of the prior art, which is provided with a transverse groove not shown, in helmet body passing over top. Front portion of the helmet body under shell and cavity 20 at the rear of helmet body located on the centerline of helmet into which rear strap 12, not shown is inserted and anchored and extends out on opposite sides of helmet to form straps 12A and 12B.

Front strap 10 passes from below and within the helmet body up and out thru an opening in helmet body, across the top of the helmet body in the transverse groove and down and back thru the helmet body thru an opening on the other side of helmet.

Cavity 20 passes generally upward thru a rearward portion of the helmet body, an impression in the upper surface of the helmet body. At were the point of cavity 20 emerges and accommodates an anchor not shown, over which rear strap 12, not shown passes. The rear strap passes from its junction with the front strap on the right side of the wearers head, up thru cavity 20 over the anchor and back down thru cavity 20 to its junction with the front strap on the left side. Chin adjustable strap 14 extends between junction point 16 on the right side of the wearer's head under the chin to a

junction point FIG. 3B on the left side of the wearer's head. The chinstrap 14 can be provided with an adjustable fastening attachment under wearer's chin or near one of the junction point.

Seen in prior art FIG. 1A to 1B, routing of rear strap 12 passes very close to the wearer's ear and high across the wearer's head. The contact points of rear straps for the prior art configuration are above the occipital protuberance of the back of wearers head with this configuration the helmet can move or shift in a fall or trauma impact accident,

Present invention is embodied in retention system 40 by providing a rear horizontal VELCRO™ strap 28 attached on opposite sides with it's VELCRO™ wrap around adjustable end means 34 loop, 36 hook to distal Y lateral straps 12A and 12B as shown in FIG. 2A, 2B, 3B, to provide a secure, comfortable, safe helmet fit on wearers head.

Protective trauma device 25 member to horizontal VELCRO™ strap 28 under occipital protuberance area provides a trauma cushion. The rear strap 12A passes from its junction with the front strap 10 on the right side of wearers head to form an adjustable chinstrap 14 which extends between junction point 16, not shown and buckle 18 on the right side of wearers head under chin to a junction point 16, on the left side of wearers head as seen in FIG. 3B. The adjustable chinstrap 14 has attached and member strap 23 with protective trauma device 22 member to it. Attached on opposite sides with short VELCRO™ wrap around fastening ends 30 hook and 32 loop just under chin to provide a cushion for absorbing shock due to the downward compression of chin into chest area in a fall or trauma accident of wear.

Adjustable chinstrap 14 is attached by fastening means under chin or junction points on helmet, when wearer tightens retention straps 12A and 12B, and adjustable horizontal VELCRO™ strap 28, helmet won't shift. Horizontal VELCRO™ strap 28 will provide a secure applied longitudinal retention across lower occipital protuberance area.

## REFERENCE NUMERALS

1 One embodiment of present invention

2 Helmet body

4 Crown segment

5 Line segment of helmet

6 Skirt portion

10 Front strap

12A Right side rear of Y distal lateral strap

12B Left side rear of Y distal lateral strap

14 Chinstrap of retention system

16 Junction point

18 Buckle

20 Helmet cavity

22 Protective trauma device, chin

23 Protective trauma device strap

25 Protective trauma device, rear under occipital protuberance

28 Horizontal strap

30 VELCRO™ hook material fastening end, device chinstrap

32 VELCRO™ loop material fastening end, device chinstrap

34 VELCRO™ loop material fastening means, device horizontal strap

36 VELCRO™ hook material fastening end, device horizontal strap

38A Cross attached member VELCRO™ strap, chin device

38B Cross attached member VELCRO™ strap, chin device

40 Retention system of helmet

42 Stitched portion of chinstrap strap

45 Opposite side, stitched portion of chinstrap strap

54 Opposite side transverse positioned slot, chinstrap device

56 Opposite side transverse positioned slot, chinstrap device

65 Opposite side transverse slot, horizontal strap

68 Opposite side transverse slot, horizontal strap

100 Shell of helmet

## **OBJECT AND ADVANTAGES**

Object is to provide a protective trauma device for helmet retention system.

Object is to provide a trauma protective device for helmet retention system, when helmets are used in bicycling, equestrian horseback, football, hockey, motorcycling and other sport activates.

Further object is to provide trauma protection to cervical spine in a fall or life-threatening sport injury where helmets are used.

Further to provide a cushion of semi rigid material of sufficient strength and elasticity to absorb trauma impact to cervical spine in fall or life - threatening sports accident.

Further to provide a concave under chin, oval trauma device member and attached to strap with adjustable VELCRO TM opposite fastening ends means, which attach to chinstrap of helmet retention system.

Further to provide a protective trauma device cushion when chin is compressed downward into chest area in a sports fall or life-threatening accident, which causes trauma impact to cervical vertebra spine and disc compression.

Further object is to provide a horizontal strap with member and attached concave trauma device with opposite ends VELCRO TM fastening means to attach to opposite sides of rear y distal lateral straps of helmet retention system.

Further to provide a horizontal strap with concave protective trauma device under the occipital protuberance in the backward flexion of head in a fall or life-threatening sport accident.

Further to provide a cushion in the backward flexion of head which cause cervical vertebra injury and disc compression in a fall or life-threatening sport impact accident.

Further to provide a cushion made up of plastic, rubber, polyethylene, semi rigid material of sufficient strength and elasticity to absorb impact trauma to cervical vertebra spine in a fall or life-threatening sport accident.

## OPERATION

In FIG. 1A shows a right side view of prior art helmet and retention system 40,

In FIG. 2A shows right side prospective view of helmet embodiment 1 and retention system 40. In accordance to present invention, showing manor in which horizontal VELCRO™ strap 28, with concave protective trauma device 25 attached to rear distal Y lateral straps 12A and 12B by VELCRO™ fastening means 34 loop and 36 hook on opposite sides as shown in FIG 2A and FIG 12B. Horizontal VELCRO™ strap 28, is longitudinal across and under the occipital protuberance of wearer. Provides trauma impact cushion protection for the backward flexion of the head and compression of cervical vertebra in a fall or life-threatening accident.

In FIG. 2B a side view of helmet embodiment 1 and retention system 40, with chinstrap 14. Strap 23 with concave oval protective trauma device 22, attached and member to chinstrap 14 by VELCRO™ fastening means 30 hook, 32 loop on opposite sides. Provides a trauma impact cushion upon the downward compression of the chin into the chest area, which causes cervical vertebra injury and disc compression. In a fall or life-threatening sport accident.

In 3A is a front view of present invention showing the above attachments to helmet retention system 40. to provide protection to cervical spine.

In FIG 3B is a left side prospective view or FIG. 2A and 2B, to provide protection to cervical spine.

In 4A shows strap 23, with concave oval protective trauma device 22, which attaches by VELCRO™ fastening means 30 hook and 32 loop on opposite sides to member chinstrap 14 of helmet retention system 40. Provides for cervical spine protection in a trauma impact fall or life-threatening accident.

In 4B horizontal VELCRO™ strap 28, with concave protective trauma device 25 provides protection to cervical spine under occipital protuberance. Horizontal VELCRO™ strap 28 is longitudinal across and attaches to rear Y distal lateral straps 12A and 12 B in FIGS. 2A, 2B, 3B, by VELCRO™ fastening means 34 loop and 36 hook.